

Carmen Cabrera-Arnau

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Education

- 2017-21 PhD in Applied Mathematics, University College London (UK)
Thesis: Mathematical modelling of social phenomena in urban areas
Supervisor: Prof Steven Bishop
Examiners: Prof Denise Pumain (University Paris I Pantheon-Sorbonne) and Prof Frank Smith (UCL)
- 2016-17 MSc in Complex Systems, King's College London (UK)
Dissertation: Random matrices spectra, towards the solution of the Bray-Rodgers equation
Supervisor: Dr Pierpaolo Vivo
Grade: Distinction
- 2012-16 BSc in Physics, University of Valencia (Spain) with year abroad at Imperial College London (UK)
Dissertation: Obtaining geometric characteristics of a directed acyclic graph from its causal structure
Supervisor: Dr Tim Evans
Grade: 9.15 out of 10, equivalent to First Class Honours

Current academic appointments

- 2022- Lecturer in Geographic Data Science, Geographic Data Science Lab (GDSL), University of Liverpool

Honorary appointments

- 2022- Honorary Lecturer, Centre for Advanced Spatial Analysis, UCL

Prior academic appointments

- 2021-22 Postdoctoral Research Fellow in Urban Mobility, Centre for Advanced Spatial Analysis, UCL
2017-21 Postgraduate Teaching Assistant, Department of Mathematics, UCL

Publications

PEER-REVIEWED JOURNAL ARTICLES

- 2024 F Rowe, C Cabrera-Arnau, M González-Leonardo, A Nasuto, R Neville. [Medium-term changes in the patterns of internal population movements in Latin American countries: effects of the COVID-19 pandemic](#). *UN-ECLAC: Population and development*.
- 2024 T Nelson, A E Frazier, P Kedron, S Dodge, B Zhao, M Goodchild, A Murray, S Battersby, L Bennett, J I Blanford, C Cabrera-Arnau, C Claramunt, R Franklin, J Holler, C Koylu, A Lee, S Manson, G McKenzie, H Miller, T Oshan, S Rey, F Rowe, S Şalap-Ayça, E Shook, S Spielman, W Xu, J Wilson. [A research agenda](#)

for GIScience in a time of disruptions. *International Journal of Geographic Information Science* 1–24.

- 2024 M González-Leonardo, [C Cabrera-Arnau](#), R Neville, A Nasuto, F Rowe. COVID-19 y movimientos de población entre la jerarquía urbana en México. Un análisis utilizando datos digitales - COVID-19 and internal population movements across the urban hierarchy in Mexico. An analysis using digital data. *Estudios Demográficos y Urbanos* 39, 3.
- 2023 [C Cabrera-Arnau](#), C Zhong, M Batty, R Silva, SM Kang. Inferring urban polycentricity from the variability in human mobility patterns. *Scientific Reports* 13.
- 2022 Y Wang, C Zhong, Q Gao, [C Cabrera-Arnau](#). Using Twitter to track internal migration before and during the COVID-19 pandemic in the UK. *Urban Informatics* 1, 15.
- 2022 R Prieto Curiel, [C Cabrera-Arnau](#), S R Bishop. Scaling beyond cities. *Frontiers in Physics* 10.
- 2021 [C Cabrera-Arnau](#), S R Bishop. Urban population size and road traffic collisions in Europe. *PLOS ONE* 16(8): e0256485.
- 2020 [C Cabrera-Arnau](#), S R Bishop. The effect of dragon-kings on the estimation of scaling law parameters *Scientific Reports* 10: 20226
- 2020 [C Cabrera-Arnau](#), R Prieto Curiel, S R Bishop. Uncovering the behaviour of road accidents in urban areas. *Royal Society Open Science* 7: 191739
- 2020 R Prieto Curiel, [C Cabrera-Arnau](#), M Torres Pinedo, H González Ramírez, S R Bishop. A continuous binning for discrete, sparse and concentrated observations *Methods X* 7: 100709
- 2019 R Prieto Curiel, [C Cabrera-Arnau](#), M Torres Pinedo, H González Ramírez, S R Bishop. Temporal and spatial analysis of the media spotlight. *Computers, Environment and Urban Systems* 75: 254 – 263

PREPRINTS

- 2024 N Newsham, P Kumar, [C Cabrera-Arnau](#), and F Rowe A Long Short-Term Memory Forecast of sub-National Population Change Across Europe. *OSF preprints* 10.31235/osf.io/9azqy .
- 2024 M González-Leonardo, [C Cabrera-Arnau](#), R. Neville, A. Nasuto, F. Rowe. “Urban Exodus” During COVID-19 in Mexico? Using Digital Data to Analyze Medium-Term Pandemic Impacts on Internal Population Movements. *OSF preprints* 10.31219/osf.io/e4au9.
- 2023 [C Cabrera-Arnau](#), LW Ng, H Wong, C Zhong. The temporal concentration of travel demand in an urban transport network. *arXiv*:2310.02385v1.
- 2023 A Renninger, V Marin Maureira, [C Cabrera-Arnau](#), R Prieto-Curiel. Detecting the sensitive spots in the African interurban transport network. *arXiv*:2307.06402v1.

OTHER

- 2021 Alan Turing Institute Data Study Group team. Data Study Group Final Report: Odin Vision. Zenodo *The Alan Turing Institute, Publications & policy submissions*.
- 2021 [C Cabrera-Arnau](#). Mathematical modelling of social phenomena in urban areas. Doctoral thesis (PhD). *University College London*.

Funding

RESEARCH GRANTS

Research income – total: £371,476.27 (USD 472,838.70)

- 2024 *Research England, University of Liverpool* - “Establishing a new cross-sector, collaborative agenda for data-driven transport planning in Liverpool City Region”. Partnership Innovation Fund, 185525. CoI. 2024. £22,342.00.
- 2024 *Economic and Social Research Council (ESRC)* - “DEBIAS. Developing a framework to measure and correct biases in human mobility data extracted from digital footprints”. CoI. 2024. £185,084.14.
- 2024 *Research England, University of Liverpool* - “TIMELY. Validating an up-to-date dataset of internal migration to inform local and regional-scale spatial planning strategies in Chile”. Public Support Fund, 182341. CoI. 2024. £74,136.53.
- 2023 *Research England, University of Liverpool* - “RECAST. Strengthening partnerships with the United Nations: Building capacity in digital footprint data for COVID-19 recovery”. Public Policy Quality-Related Pump-Priming Fund, 177990. CoI. 2023. £89,913.60.

CONSULTANCY

- 2024 “LCRCA Pedestrian Infrastructure, Accessibility & Safety”. Liverpool City Region Combined Authority – <https://www.liverpoolcityregion-ca.gov.uk>.

TRAVEL GRANTS AND FUNDED RESEARCH VISITS

- 2024 *Center for Monetary and Financial Studies (CEMFI), Spain* - Research visit. Travel grant: 2,500€.
- 2024 *Barcelona Supercomputing Centre, Spain* - Research visit. Travel grant: 1,000€.
- 2023 *University of California Santa Barbara, US* - Specialist Meeting 2023. Travel grant: \$800.
- 2018 *NTU, Singapore* - Winter School on Complexity Science, Singapore. Travel grant: £1,837.
- 2015 *IFISC (CSIC-UIB), Spain* - “Chimera states in an oscillator network under non-local coupling effects”. Summer Undergraduate Research Fellowships. PI. 2015. 1,100€.

SCHOLARSHIPS AND STUDENTSHIPS

- 2017-21 *Department of Mathematics, UCL*. Teaching Assistantship to complete fully-funded PhD studies.
- 2019-20 *Department of Mathematics, UCL*. Monica Hulse Scholarship, awarded yearly to one postgraduate student based on academic merit. £500.
- 2016-17 *Department of Mathematics, King’s College London*. E T Davies Scholarship, awarded yearly to one or two outstanding applicants. £1,000.
- 2016-17 *La Caixa*. Scholarship awarded to 65 top Spanish candidates to complete postgraduate studies abroad. £27,000.

Honours and awards

- 2024 Fellow of the Higher Education Academy
- 2021 Associate Fellow of the Higher Education Academy
- 2021 Nominated & invited to the Global Young Scientists Summit, National Research Foundation, Singapore

Talks

KEYNOTE TALKS

- 2025 Complenet 2025, Fortaleza, Brazil
- 2024 Conference on Complex Systems (UrbanSys), Exeter, UK
- 2022 Early Career Researchers in Mathematics (ECRM) conference, UCL, UK

INVITED SEMINAR TALKS

- 2024 BT, London, UK — online
- 2024 Spatial, Computational, and Real-Time Analytic Methods (SCRAM) Working Group — online
- 2024 Escuela de Negocios, Universidad Adolfo Ibáñez, Viña del Mar, Chile
- 2024 Departamento de Ciencias de la Computación, Universidad de Chile, Santiago, Chile
- 2024 Urban Beers, Santiago, Chile
- 2024 EchonophysiX, Ecole Polytechnique, Paris, France — online
- 2023 EdinbR, Edinburgh, UK
- 2023 Department of Human Geography lecture series, University of Toronto, ON, Canada — *Cancelled*
- 2023 Quantitative Spatial Science seminar, University of Bristol, UK
- 2022 Disordered Systems Group seminar, King's College London, UK
- 2022 Geographic Data Science Lab seminar, University of Liverpool, UK
- 2022 Centre for Complexity Science seminar, Imperial College London, UK
- 2022 Networks seminar, Centre for Advanced Spatial Analysis, UCL, UK
- 2021 Networks seminar, Centre for Advanced Spatial Analysis, London, UK
- 2021 Disordered Systems Group seminar, King's College London, UK
- 2020 Complexity Lates, London Institute for Mathematical Sciences, UK
- 2019 Postgraduate Seminar, Dept of Mathematics, UCL, UK

CONTRIBUTED TALKS

- 2024 British Society for Population Studies Annual Conference, Bath, UK
- 2024 Complenet 2024, Exeter, UK — *Awarded best talk*
- 2023 Korean Research Institute of Human Settlements & GDSL knowledge exchange, Seoul, South Korea
- 2023 GISRUK, Glasgow, UK
- 2022 Korean Research Institute of Human Settlements & GDSL knowledge exchange, Liverpool, UK
- 2022 Conference on Complex Systems, IFISC, Palma de Mallorca, Spain
- 2022 GISRUK, Liverpool, UK
- 2020 Graduate Student Meeting, London Mathematical Society, UK — *Awarded best talk*
- 2019 Poster presentation at Latin American Conference on Complex Networks, Cartagena, Colombia

Conferences, workshops and events

ORGANISATION

- 2024 Working group meeting 1 for Nowcasting Populations: “Understanding the opportunities, limitations and challenges of digital data sources for nowcasting populations”, University of Liverpool, Liverpool, UK
- 2024 Training workshop “An introduction to network analysis”, British Society for Population Studies Annual Conference, Bath, UK
- 2024 Training workshop “An introduction to network analysis”, British Society for Population Studies Annual Conference, Bath, UK
- 2024 Expert workshop for the “Validation of a dataset on internal migration”, Ministry of Social Development,

- Santiago, Chile
- 2023 Training workshop “An Introduction to Network Analysis for GIS”, GIScience 2023, Leeds, UK
· Workshop website: <https://crmna.github.io/nets4gis/>
- 2023 Training Workshop “RECAST Project - Use of digital traces for the measurement and monitoring of population movements”, United Nations - ECLAC, Santiago, Chile
· Workshop website: <https://fcorowe.github.io/dfd4mobility/>
- 2023 Policy Workshop “RECAST Project”, United Nations - ECLAC, Santiago, Chile
- 2023 Workshop “RECAST Project - Developing a Collaborative Project Plan”, United Nations - DPPA, New York City, NY, US
- 2023 Research Roadshow, School of Environmental Sciences, University of Liverpool, UK

CONTRIBUTION AND PARTICIPATION

- 2025 Complenet 2025, Fortaleza, Brazil
- 2025 Working group meeting 3 for Nowcasting Populations: “Methods session II”, University of Southampton, Southampton, UK.
- 2024 Working group meeting 2 for Nowcasting Populations: “Methods session I”, University of Manchester, Manchester, UK.
- 2024 Working group meeting 1 for Nowcasting Populations: “Understanding the opportunities, limitations and challenges of digital data sources for nowcasting populations”, University of Liverpool, Liverpool, UK.
- 2024 British Society for Population Studies Annual Conference, Bath, UK
- 2024 Conference on Complex Systems (UrbanSys), Exeter, UK
- 2024 AGILE 2024, Glasgow, UK
- 2024 Complenet 2024, Exeter, UK
- 2023 Specialist Meetings 2023: Spatial Data Science in an Age of Scientific Disruption, University of California Santa Barbara, Santa Barbara, US
- 2023 GIScience 2023, Leeds, UK
- 2023 Korean Research Institute of Human Settlements & GDSL knowledge exchange, Seoul, South Korea
- 2023 GISRUK23, Glasgow, UK
- 2023 Turing-Newcastle scoping workshop on “Data and Data Science for the Measurement, Understanding and Mitigation of Place-Based Disparities”, Newcastle University, UK
- 2022 Workshop ‘UA 2.0 – Inequalities in the Recovery of Cities and Regions’, Alan Turing Institute Urban Analytics, Liverpool, UK
- 2022 Korean Research Institute of Human Settlements & GDSL knowledge exchange, Liverpool, UK
- 2022 Conference on Complex Systems 2022, Palma de Mallorca, Spain
- 2022 GISRUK22, Liverpool, UK
- 2021 Global Young Scientists Summit, National Research Foundation, Singapore
- 2019 MacArthur Workshop on Urban Modelling & Complexity Science, CASA (UCL), London, UK
- Talking Maths in Public, Isaac Newton Institute, University of Cambridge, Cambridge, UK
- 2019 LANet2019 - Latin American Conference on Complex Networks, University of Los Andes, Cartagena, Colombia
- 2019 Workshop on Economic Science with Heterogeneous Interacting Agents, UCL and City University of London, UK
- 2019 Enrico Fermi Intl. School on Computational Social Science and Complex Systems, Varenna, Italy
- 2018 NTU Winter School 2018 on Complexity Science, Nanyang Technological University, Singapore

Teaching

POSTGRADUATE

University of Liverpool

- 2022- *Module lead:* Population Data Science - Module website: <https://www.population-science.net/>
2023- *Lecturer:* Geographic Data Science - Module website: <https://pietrostefani.github.io/gds>
2022- *Supervisor:* MSc in Geographic Data Science Dissertation

Centre for Monetary and Financial Studies (CEMFI)

- 2024-25 *Lecturer:* Geographic Data Science for Applied Economists (part of the Urban Economics course taught by Prof. Diego Puga) - Module website: <https://crmnca.github.io/gds4eco/>

UNDERGRADUATE

University of Liverpool

- 2023- *Supervisor:* BA in Geography Dissertation (9+ students)
2022- *Lecturer:* Field Class Year 3 (BA in Geography) in Toronto, ON, Canada
2022- *Lecturer:* Contemporary Population Dynamics
2021- *Supervisor:* MSc in Geographic Data Science Dissertation (total of 2 students)
2022-23 *Lecturer:* Population and Societies

University College London

- 2021- *Supervisor:* MSc in Urban Spatial Science Dissertation at CASA (total of 3 students)
2018-20 *Module lead:* Mathematics for Engineers (Dept. of Mathematics)
2017-20 *Small group teaching:* Calculus in Several Dimensions, Applied Mathematics and Newtonian Mechanics, Mathematical Methods, Bridging Course, Year 12 Summer Challenge, Quantitative Methods (Dept. of Mathematics)

Research supervision

PHD SUPERVISION

- 2024- Emiliano Beltrán Alipio. “Safeguarding urban communities: Using data science to determine the impact of the spatial structure of urban activities and residential segregation on the spreading of infectious diseases”. *University of Liverpool*.
2023- Alice Varley. “Understanding social and spatial inequalities in common mental health disorders”. First supervisor, *University of Liverpool*.
2022- Andrea Nasuto. “Understanding the role of social media in promoting anti-migration sentiment and hate crime”. Second supervisor, *University of Liverpool*.
2022-24 Niall Newsham. “What do “left behind” areas look like over time?”. Second supervisor, *University of Liverpool*.

RESEARCH ASSISTANT SUPERVISION

- 2024 Michael Mahony. “TIMELY Project”. With Prof. Francisco Rowe, *University of Liverpool*.
2023 Andrea Nasuto. “RECAST Project”. With Prof. Francisco Rowe, *University of Liverpool*.
2023 Ruth Neville. “RECAST Project”. With Prof. Francisco Rowe, *University of Liverpool*.

Service

EDITORIAL ROLES

2023-2017-21 Junior Editor, Computational Urban Science.
Editor, [Chalkdust](#).

PHD EXTERNAL EXAMINER

2024 Irene Meta. “City Physiology Framework: A Conceptual Approach to Improve Urban Simulations”. *Universitat Internacional de Catalunya, Spain*.
2023 Jonathan Kent. “Urban Fabric Designed for Diversity: How the Structure of Great European Cities Influences Attitudes and Behavior”. *Universitat Pompeu Fabra, Spain*.

JOURNAL REVIEWS

International Journal of Geographic Information Science · Journal of Computational Urban Science · Cities · Environment and Planning B: Urban Analytics and City Science · Geographical Analysis · Computational Urban Science · Heliyon · Journal of Statistical Physics · PLOS ONE · Sage Research Methods

GRANT REVIEWS

Caixa – Social Research Call

COMMITTEE MEMBERSHIP

2024 Scientific committee. Netsci 2024. International School and Conference on Network Science, Québec City, Canada.

LEADERSHIP AND EQUALITY & DIVERSITY

2023-2018-21 Early Career Academic Lead Representative, School of Environmental Sciences, University of Liverpool
Equality & Diversity Committee PhD representative, Department of Mathematics, UCL
· Contributed to the successful application for the Athena SWAN Silver Award 2021

OUTREACH

2024 Workshop for Year 12 students: “Mapping connections: a journey through Networks and Geography”. University of Liverpool, UK
2019 Drop-in activity at IMA Festival of Mathematics and its Applications, University of Greenwich, UK
2019 Talk: Understanding Complexity, Girls in Maths Day, St John Bosco College, London, UK

Relevant skills

Python (8+ years experience): data analysis, mathematical and statistical modelling, geospatial analysis, simulations, optimisation, visualisation, machine learning

Other programming languages: R, Matlab, C++/C, FORTRAN

Experience working with data at the **Secure Research Service of the UK Office for National Statistics**, including being **trained as a Full Accredited Researcher**

Software and cloud-based services: GitHub, LaTeX, Overleaf, Quarto, Microsoft Office, etc.

Languages: English (fluent), Spanish (native), Catalan (native), French (intermediate)

Last updated: November 14, 2024